



Golden  
Empire  
Amateur  
Radio  
Society, Inc.

www.gears6rhc.org

"Dedicated to Public Service"

# THE RADIATOR



W6RHC  
IRLP #8170



P.O.Box 202 Chico, CA 95927

April 2019 Newsletter

GEARS Founded August 13, 1939

## Regular Events

O.A.R.S. GENERAL MEETING Second Friday, of month, 7:00 pm, at St. Paul's Church Parish Hall, 1430 Pine St., Oroville

G.A.R.S. Second Thursday of month, 6:30 pm Lutheran Church Hall, Artois.

G.E.A.R.S General Meeting, third Friday of month, Butte County Search and Rescue Bldg., Chico. Social hour 6:00 pm, meeting at 7:00 pm.

GEARS Breakfast 2nd Saturday of each month 9am Farmers Skillet 1818, 690 Rio Lindo Ave, Chico Everyone Invited.

Board Meetings: 2nd Saturday of each month at the Blood Source Building, Rio Lindo Ave Chico, after the monthly breakfast.

Butte A.R.E.S. 3rd Tuesday at The Veterans Hall, Rio Lindo Chico. Except Nov & Dec.

FCC EXAMS - GEARS VEC First Sunday of every even numbered month, at the Butte County Search and Rescue Building. Written test at 2:00 pm. For information or pre-registration call Gene Wright WA6ZRT 519-2519



Join GEARS on Facebook  
[www.facebook.com](http://www.facebook.com) For timely news and additional information.

## News

At our March meeting Kent Hastings WA6ZFY talked about about his QRP QSO's. It was very interesting to hear how well low power can make distant contacts under the right conditions.

Be thinking of the auction coming up at our May meeting. If you have any equipment you would like to sell or donate, please contact Gene.

In our last newsletter we ran an article on the Klystron Tube. This month we feature the other microwave tube, the Magnetron. Next month you'll hear about the secret laboratory where this all came together.

The Benicia Amateur Radio Club will be offering a one-day Ham Radio Class on Saturday May 4th. Pass this information along to anyone looking for training. See information below.

The Wildflower bicycle event is Sunday April 28th. We have several locations that need operators for communications support. Please contact [kfavor@gmail.com](mailto:kfavor@gmail.com) to sign up.

73

Jim Matthews K6EST  
[jiminchico@yahoo.com](mailto:jiminchico@yahoo.com)  
530-893-3314

## April Calendar

G.E.A.R.S General Meeting, Friday April 19th, Butte County Search and Rescue Bldg., Chico. Social hour 6:00 pm, meeting at 7:00 pm.

GEARS monthly breakfast Saturday April 13th, 9 am at Farmers Skillet Cohasset and Rio Lindo Chico.

Board Meetings: Saturday April 13th after breakfast at the Blood Source Building

Butte A.R.E.S. Meeting Tuesday April 16th, at Chico Veterans Hall 7pm. Contact Dale Anderson, KK6EVX 826-3461 for more information.

VEC Testing Sunday April 7th at the Search and Rescue Building 2 pm.

## NETS:

GEARS Club Net Tuesdays 7:30 PM 146.850 MHz - PL 110.9

GARS Club Net: Monday, 7:00 pm 147.105 MHz + PL 110.09

Simplex Net Thursday 7:30 p.m. 146.52

Sacramento Valley Traffic Net

Nightly 9:00 PM 146.850 MHz - PL 110.9

ARES Nets: Butte Mondays 20:00 145.290 MHz - PL 110.9

Yuba Sutter Thursdays 19:00 146.085 MHz + PL 127.3

Glenn Thursday 19:30 147.105 MHz + PL 100.0

## Resonant vs Non-Resonant Antennas

There Ain't No Free Lunch

OK. The English is bad but the title says it all. So many hams are looking for that "all band, does everything" HF antenna.

On VHF and UHF the "tuning" of an antenna is far less critical than on HF. The wavelengths at 144 MHz and above provide a naturally wide bandwidth so that you assemble the antenna and, in most cases, it just works. Nearly all transmitting antennas at VHF and above are resonant types.

There are basically only two classes of HF antennas: Resonant and Non-Resonant. Let's look at resonant antennas first.

Resonant antennas include (but are not limited to) monoband dipoles, monoband and trapped verticals, mono-band and trapped multiband Yagis, and specialized multiband antennas like fan and parallel dipoles. Resonance may be designed into these antennas by the use of traps, linear loading, stubs, or by the natural resonance of the length of the radiator. With these antennas, resonance occurs only in narrow chunks of spectrum.

Non-resonant antennas include (but are not limited to) long-wires, un-trapped multiband verticals, off-center fed dipoles, and other compromise antennas. These antennas typically require a wide-range antenna tuning unit (ATU).

On HF, the wavelengths are long to very long and resonance becomes more critical. A dipole on 80 meters



Bushcomm BA Series Monoband Dipole Antenna

may have a useful SWR bandwidth of only 60 kHz or so. If you want to work 75 phone with an 80 meter CW antenna, you'll need an ATU (better referred to as a transmatch) to compensate. All resonant HF antennas – ALL OF THEM – used outside their resonant bandwidth require the use of a tuner. If you are looking for an antenna that will cover 160 through 6 and work efficiently... that hasn't been invented yet.

Non-resonant antennas may be force-fed using ATUs in conjunction with baluns or feedline current chokes. Baluns and chokes will keep RFI out of your shack and allow the tuner to force-feed the non-resonant antenna so that power is radiated instead of being lost in standing waves or impedance losses. For example, 43 foot verticals are 43 feet long to avoid accidental resonance. In other words, they're designed to be totally non-resonant. Their balun or unun and associated ATU allow them to work across a very wide spectrum. The lower the frequency, however, the poorer the efficiency of these antennas becomes.

Compromise antennas require compromise solutions and support. There ain't no free lunch!

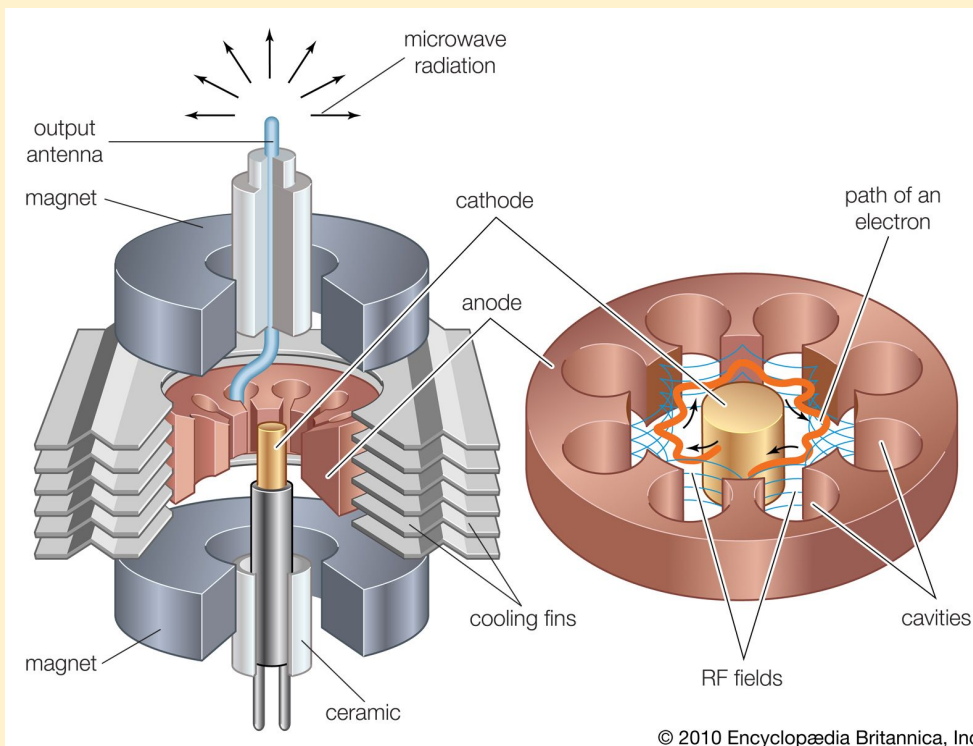
From: OnAllBands Dec 9, 2018

## History of the Cavity Magnetron Tube

Every time you warm something in a microwave oven, you use a device that helped change the course of history during World War II: the cavity magnetron tube. Because it can produce large amounts of power very efficiently, the cavity magnetron helped scientists and engineers in Great Britain, the U.S., and other countries to build compact, efficient radar sets that could spot enemy planes, ships, and even submarine periscopes miles away in the dark. When thousands of these sets were installed on land, at sea, and in aircraft, they made a critical difference in many battles throughout the war. The cavity magnetron was invented in England under wartime pressures. When Germany attacked Poland in September 1939, English scientists had already installed a coastal radar system called Chain Home to detect incoming flights of German bombers. It used VHF waves that required antennas 110 meters (360 feet) high. In order to make radar sets small enough to fit on ships or , engineers needed to use much shorter wavelengths, like those in the region. But in 1939, no one knew how to produce the high-power microwaves needed to build radars that could "see" over a distance of many miles.

Under the direction of Australian physicist Mark Oliphant, two engineers at the University of Birmingham

named Harry Boot and John Randall combined a number of ideas from researchers in the U.S, Denmark, France, and Japan. A type of electron tube called a "magnetron" had been invented almost twenty years earlier by U.S researcher A. W. Hull. Hull's tube had a hot filament wire that emitted and a cylindrical plate around the filament that collected them. Normally, in a vacuum tube go in straight lines from the filament to the plate. But Hull put a magnetic field on the tube, and this field made the go in curved paths. Hull could control the amount of current reaching the plate by varying the magnetic field strength, but he found few



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practical uses for his. By 1939, other researchers had discovered that under certain conditions, the magnetron could produce very high- radio waves. Boot and Randall decided to construct a magnetron that could handle a lot of power and generate microwaves efficiently. Most at that time used glass envelopes to enclose the evacuated space inside of the device. Instead of glass, Boot and Randall made their magnetron tube enclosure out of a solid block of copper, which conducts heat very well. In order to tune the tube's output wavelength efficiently, they drilled special holes called "cavities" into the block. Just as the length of an organ pipe tunes the pipe to a certain pitch, the size of a magnetron's cavities can efficiently tune microwaves to a certain wavelength. Then Boot and Randall put the entire tube into a strong magnetic field that swept past the cavities in a rotary motion.

On February 21, 1940, the English researchers tested their first working cavity magnetron. When used with the new Klystron tube it produced over 400 watts of power at the extremely short wavelength of 9.8 cm. This was nearly a hundred times more power than anyone else had ever produced at that wavelength. By May, other researchers were using the cavity magnetron in a radar set that could detect a submarine periscope six miles away. In September of 1940, a British delegation under Sir Henry Tizard carried a cavity magnetron secretly across the Atlantic and persuaded the U.S to begin large-scale development and of the device.

Many historians believe that the advantage the magnetron gave to U.S allies in World War II made a significant difference in many phases of the war. Since World War II, most of the important types of magnetrons that are used to generate microwave power (including those in microwave ovens) are cavity magnetrons. For more watch these videos: <http://youtu.be/DT9oSyQpdoE> and <http://youtu.be/Dxfj1LY7Tm0>

From Engineering and Technology Wiki: ethw.org July 2018

#### Club Officers:

President.....Jim Matthews, K6EST  
Vice-President.....Kent Hastings, WA6ZFY  
Secretary.....Stephan Lonis, KM6RSO  
Treasurer.....Kathy Favor, K6FAV  
Director.....Rick Hubbard, KI6VOS  
Director.....Arnott Smith, KF2TM  
Director..... Dale Anderson, KK6EVX  
Past President.....Tom Rider, W6JS

#### DO YOU HAVE OLD QST MAGAZINES IN SEARCH OF A NEW HOME?

Gene Wright has that future home for your QST's, through his project to place QST Magazines in professional offices throughout Chico. Labels placed on the QST's will advertise the Golden Empire Amateur Radio Society, encourage the readers to consider Ham Radio as an interesting hobby, one of not only fun, but which provides opportunities for many and various community services.

Bring your QST's to Gene at the Club meetings or contact:

Gene WA6ZRT  
530-519-2519



Spring is in the air, so it must be time for the Wildflower bike event!

This year the event will be on Sunday April 28th.

If you would like to volunteer please send an email to Kathy Favor [kfavor@gmail.com](mailto:kfavor@gmail.com) and let her know which location (and shift, if needed), and your shirt size. Be aware women's sizes run a little small.

We'll get shirts and signs to everyone after Wed April 24th. Kathy can also use some help with this.

Wildflower will have all the same routes as last year. Here is a link to the Wildflower routes for the year: <https://www.wildflowercentury.org/routes.html>





Saturday, May 4th, 2019 - Benicia, CA



# AMATEUR RADIO LICENSE CLASS

**Study Session followed by Exam**

**When:** Saturday, May 4th, 2019

**7:30 AM - 5:00 PM**

**Where:** Benicia Senior Center

1201 East 2nd Street, Benicia

**What:** Technician Class (beginner's level)

General Class Upgrade (for those already licensed as a Tech)


**Fee:** \$35.00 (Includes exam fee)

**Register:** [www.BeniciaARC.com](http://www.BeniciaARC.com)

**Questions:** [HamRadioClass@BeniciaARC.com](mailto:HamRadioClass@BeniciaARC.com) or Art at (925) 212-9953

Conducted by:  
Benicia Amateur Radio Club (BARC)  
Member W5Y1VEC  
Serving the Benicia Fire Department and  
the Residents of the City of Benicia

Class size is limited and always fills up.

 Please Register and Pre-pay online for a guaranteed seat.

No prep or prior study required.



Prospective Hams should plan on attending a free Get-On-The-Air Class  
after passing their test, to become familiar with Amateur Radio operations

**Reserve Your Space - Become a Ham in One Day!**



Can't make the  
upcoming class?  
Check our website  
periodically for our  
next session.

Element 4 (Extra class)  
You need only pay the  
test fee of \$14. We do  
not provide study  
materials for Element 4.



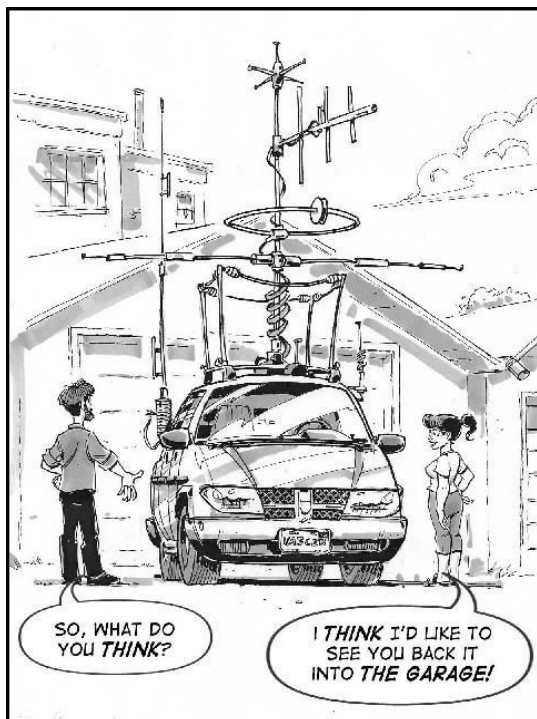
File: Ham Class May 2019 #1c



## HAM RADIO SUBGROUP: THE MORSE CODE RAPPERS

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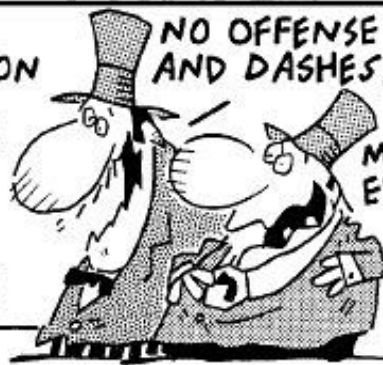


S. MORSE  
INVENTOR

TODAY:  
DEMONSTRATION  
OF  
TELEGRAPH

NO OFFENSE TO YOUR DOTS  
AND DASHES, MR. MORSE,  
BUT HOW  
MUCH CAN YOU  
EVER DO WITH  
JUST A  
BINARY  
CODE?

Art by: Art Thaves



~THAVESM 7-1

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[www.hamradioarrl.com](http://www.hamradioarrl.com)